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#50050

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NPIC/TSSG/RED-098-70
24 March 1970

MEMORANDUM FOR: Chief, Special Contracting & Procurement Staff, TSSG
SUBJECT : Request for Proposals for a Design Concept for a Color Control Cell #50050

1. It is requested that copies of the enclosed Development Objectives for a Design Concept for a Color Control Cell with attachments be sent to the organizations on the attached list. The organizations which are interested should be instructed to submit proposals prior to 15 April 1970.

2. The Agency Association and nature of work for this project are SECRET.

3. The title is UNCLASSIFIED.

4. Personnel working on this contract will require codeword clearances.

5. The Technical Services & Support Group plans to commit FY-70 funds to this project.

6. In your communications with prospective contractors, it is requested that the project number be used as given above and be included as part of the title.

[Redacted]
Deputy Chief, Research & Engineering Division,
TSSG

25X1

Attachments:

1. Development Objectives
2. Proposal Format
3. List of Contractors
4. DB-1001

Distribution:

- Orig - Addressee
1 - NPIC/TSSG/RED
✓2 - NPIC/TSSG/RED/SRB

Declass Review
by NIMA/DOD

NPIC/TSSG/RED/SRB/[Redacted] (23 Mar 70)

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GROUP 1
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17 March 1970

DEVELOPMENT OBJECTIVES
DESIGN CONCEPT FOR A COLOR CONTROL CELL

1. INTRODUCTION

These development objectives describe requirements to be met in the preparation of a Design Concept for a Color Control Cell, a facility which will provide the proper environment in which to carry out photo interpretation and photo-scientific experiments on a new family of high resolution, color reconnaissance photography taken at very high altitudes.

2. BACKGROUND

2.1. As a result of great improvements in the imaging characteristics of aerial color film in recent months, increasing amounts of such film are being flown for the assessment of Essential Elements of Information (EEI's) related to the use of color imagery in military reconnaissance. This trend is expected to accelerate in the next several years, as development continues on presently less-than-optimum copy film for reproduction of working copies. It is anticipated that product improvement of both original and copy material will continue, necessitating a continuing R&D effort in several categories of color reconnaissance film utilization.

2.2. Specifically, several initial studies are starting in the areas of: (a) establishing processing, viewing, and reporting standards for color-oriented Essential Elements of Information (EEI's); (b) developing and modifying equipment to permit optimum copying of photographic color originals; (c) analyzing the effect of the new color film structure on the continuing requirement for accurate mensuration of photographic images; (d) developing a plan for training all types of personnel who must exploit color photography.

2.3. These studies are not a part of this project; however, results from these programs need to be correlated with the subject design concept for the Color Control Cell (CCC) to the extent possible within the time frame of this contract. Similarly, the contractor for the CCC design concept will be required to stay cognizant of continuing improvements in the development of the new high resolution color films, which involve unique coating and arrangement of film layers.

3. CONCEPT

3.1. Purpose - It is the primary purpose of this study to develop a design concept for a facility with which to, first, neutralize the environment and then study the effect of manipulating that environment while conducting PI and photo-scientific tasks. An important sub-task, and perhaps the guiding principle behind the design concept, is accommodation for

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accurate color discrimination (identification). In other words, the CCC should neutralize visual phenomena which would otherwise interfere with accurate film image color identification by the human visual apparatus.

3.2. Scope - This study shall produce a thorough report detailing the results of the contractor's analyses and defining, in general terms, the physical and functional characteristics of the Color Control Cell and equipment therein. During the course of his study, the contractor will examine the theoretical problems of using existing PI and photo-scientific equipments to analyze the new color films and make general recommendations for their modification. The scope of this effort will not include detailed designs at this time.

4. REQUIREMENTS

4.1. Functions of the Color Control Cell

4.1.1. Environment - The CCC must be usable to conduct meaningful experiments to define and develop optimized techniques for interpreting and analyzing the new families of color reconnaissance films. To achieve such purposes, the selected contractor may determine that illumination (both environmental and instrument) should be "modifiable" as to color characteristics. Similarly, consideration must be given to convertible or flexible work space configurations and surface colors to permit testing of theoretical arrangements. In studying this, the response of the human eye and the limits and types of visual anomalies permissible will be considered by the contractor.

4.1.2. Photo Interpretation Experiments - The design concept for the Color Control Cell shall be consistent with future human factors research and experimentation with existing PI light tables, microstereoscopes, and projection viewers. When completed, the CCC must permit the test and evaluation of certain specialized light tables and rear projection viewers equipped with light sources capable of chromatic manipulation. Such instrumentation is either under development or being considered for funding under separate efforts. In follow-on programs to this design concept study, the impact of the new color films, displayed on the above equipments in the CCC, will be categorized and studied as to phases of PI activities (detection, identification, interpretation) and target types. To the degree possible within the scope of this conceptual study, the contractor will consider the relevance and limits of image luminance requirements and magnification while viewing color films, and the extent to which optics and light sources of viewing instruments must be modified or newly developed to be in accord with the ranges of environmental adjustment recommended in the resulting design concept for a Color Control Cell.

4.1.3. Photo-Scientific Experiments - Within the Color Control Cell, numerous objective and subjective color film assessments and evaluations must be made, which are those of the photo-scientist, as

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opposed to those of the photo interpreter. It may be possible to conduct such evaluations concurrently (or alternately) within a single cell configuration, or it may be necessary to differentiate between categories by setting up a second Color Control Cell. The design concept for the CCC must recommend between these choices and must accommodate expansions of such current evaluations as:

- Comparative studies between two different camera systems or missions.
- Changes in images produced by deviations within a mission.
- Performance comparisons between emulsions, lenses, printers, and processors.
- System and film assessment of anomalies in resolution, density, contrast, color balance, color saturation, exposure, illumination, obliquity, focus, image motion compensation, astigmatism, chromatic aberration, light leaks, vibration, contaminated processing solutions, chemical precipitation, improper light sources, filtration, magnification.
- Studies in preparing optimum density/contrast reproductions.
- Color separation studies and analysis of the interactions between color film layers.
- Image quality grading studies.

4.2. Color Definition

4.2.1. Standards - The selected contractor will coordinate with a parallel effort under way to establish a system of standards by which photo interpreters can properly identify film image colors in a manner useful for intelligence purposes. With major emphasis on utilization with film transparencies, all pertinent color measuring systems (e.g., Munsell, ISCC-NBS, C.I.E., Densitometric-Munsell) are being considered; in support of the latter physical technique, generation of a chromaticity grid to determine C.I.E. coordinates on the new original color film has been proposed for funding. With these inputs, the sponsor is planning to start from a base defined recently by the USA Standards Institute for viewing and comparing color transparencies in the Graphic Arts and related industries, supplemented by specifications from the Illuminating Engineering Society. From that base, appropriate modifications will be applied for dealing with any special requirements for photo interpretation and photo-scientific analysis, and these modifications will be made available for the CCC design concept.

4.2.2. Techniques - It is required, additionally, that the design concept formulate techniques by which image colors may be effectively differentiated and identified, in the context of the yet-to-be-established color viewing and reporting standards. Determination of tolerances to which color information should be obtained may well depend upon the optimum method. It is required that consideration be given to both human visual and photo-electric (machine) techniques, even though the foregoing CCC design concept emphasizes the visual effects. Equipment candidates for

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25X1 visual techniques include existing PI light tables, microstereoscopes, and projection viewers; versions of commercial photo assessment viewers (for example); a proposed visual trichromatic colorimeter; an existing monoscopic colorimeter design; and optical techniques of split field and "flicker", in general. Among the "machine" techniques, the contractor should consider the utility of existing or conceptualized photo-electric colorimeters, densitometers, spectrophotometers, and spectral radiometers. In this area, also, coordination with other on-going efforts in this office will be required (as indicated in section 4.2.1). While the selected contractor must consider all these concepts, he should not be limited to them in developing the overall design concept.

5. MISCELLANEOUS

5.1. Reporting - The contractor will be required to provide monthly reports and a Final Report. The monthly reports will follow the DB-1001 specification attached. The final report will provide a complete design concept, upon which a follow-on detailed design can be directly based. The final report must be completed within 30 days of the completion of the investigations and within the allowable cost of the contract.

5.2. Proposal Format - The submitted proposal will conform to the attached guide for proposal format.

5.3. Level of Effort - It is desired that this study consume no more than four months from contract initiation.

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